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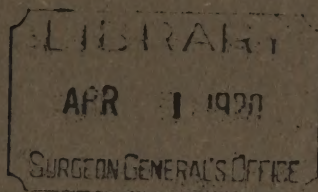
ASCULTATORY PERCUSSION
IN DIAGNOSIS OF CARDIAC
LESIONS.

BY

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AUSCULTATORY PERCUSSION IN DIAGNOSIS OF CARDIAC LESIONS.*

By W. F. MILROY, M.D.,

OMAHA, NEB.

DOUBTLESS many of you are acquainted with the paper recently presented before the Council on Medical Education by General Edward L. Munson, entitled "The Needs of Medical Education as Revealed by the War." General Munson had general charge of medical department training for a year. He showed that the medical officers who finally reached the medical training camps were quite superior to the average of the medical profession of the country and yet of these men a very large number were found to be professionally not qualified. Later, in a reply to this paper, Dr. Vaughan called attention to the splendid work that has been done by these very men, by inference at least, taking exception to the severe criticism of General Munson. Although everything that was claimed by Dr. Vaughan be admitted, it cannot be denied that a large number of medical men seeking service in the army were found to be ill prepared for their work. Instructors from several of the army schools

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have told me personally of their astonishment at the inefficiency of these doctors in respect to physical diagnosis. Not only was this true of young and inexperienced men, but also of physicians who had had years of experience and often those who in their own communities were regarded as highly capable and enjoyed an excellent practice.

In the *Journal of the American Medical Association* of January 18, 1919, appeared a paper by George Edmeston Fahr and others, entitled "Cardiovascular Examination of Fifty-five Thousand Recruits." The work reported was performed at Camp Travis, Fort Sam Houston. These recruits were sent from Texas and Oklahoma. As a result of their observations these writers remark: "We can hardly believe that the majority of the local boards sending men to Camp Travis are capable of picking up many cases of valvular diseases of the heart."

Now, this recent experience of our army has not surprised me. It only confirms the opinion I have held for years, derived from personal observation.

Diseases of the heart result in as many deaths as tuberculosis, perhaps more. It is of vital importance that physicians should be able to recognize heart lesions. It seems that a large proportion of students are victims of the delusion that they have mastered the subject of cardiac diagnosis as soon as they have learned its rudiments, and this delusion is incurable.

What interests me most deeply in this business is not scientific accuracy in differentiating a lesion; this is interesting and commendable, but clinically of comparatively little consequence. On the contrary, it is a matter of the biggest consequence to a patient whether he has a sound heart or a

defective heart that means his destruction sooner or later. I am not encouraging or excusing slovenliness in diagnosis, but in face of the existence of such general incompetence in this matter I am willing to accept a diagnosis which, if imperfect, is sufficient to serve as an indication for treatment. Such a diagnosis is the recognition of the fact that an organic lesion exists.

From the beginning students are taught to study murmurs. They try to hear murmurs, and say they hear them when they do not. I believe this often is due to the use of a bad stethoscope and its roar or squeak or jingle is all they hear. They may make out a murmur and try to discover its peculiarities. A few students learn to recognize certain of these, the balance wish they might, and let it go at that. The result is the incompetency we have been hearing about.

Now let me ask you for a time to forget that anybody ever heard a cardiac murmur. It is a reasonable and well established fact that every valvular lesion which causes a departure from the physiological functioning of the heart imposes upon some part of that organ a demand for an abnormal amount of work. Initial dilatation follows, but eventually it rises to the occasion and compensatory hypertrophy develops. The heart is enlarged. Speaking not with absolute accuracy, but with a sufficient degree of accuracy for a working basis, it may be affirmed that every organic cardiac lesion results in cardiac enlargement; and conversely, the absence of cardiac enlargement disproves the presence of any organic lesion. Since this is true, if I am able to determine the size of the heart I am on perfectly safe ground, because I know absolutely whether the organ is sound or diseased; and if

diseased, I can form an idea of the severity of the lesion and, by the aid of general symptoms, of the degree of compensation that exists. Should I determine that treatment is indicated, it will be on account of imperfect compensation and it will be immaterial what valvular lesion is responsible. I have not listened for a murmur. I know nothing about murmurs. I only know that something has gone wrong with the mechanism of this heart which has placed an abnormal demand for work upon it, or that a diseased muscle is giving way under the strain. It is my idea that better results could be attained by teaching students how to determine the size of the heart rather than to permit them to be wholly absorbed in the study of murmurs, which experience has shown to be, to the end of their career, a babel of sound inaudible or untranslatable, or both.

Now, in the auscultatory percussion we have a method of measuring the heart which is always available, and always sufficiently exact, and proficiency in its use is readily acquired.

Examination of a dozen more recent books upon the subject of physical diagnosis shows that some of them make absolutely no reference to auscultatory percussion of the heart, some of them casually mention it, a few damn it with faint praise. To me this lack of interest is not surprising, since the method is worthless if employed as they describe it, viz., by percussion in concentric and narrowing arcs of circles about the stethoscope.

Every form of matter capable of sonorous vibration has its fundamental note. Tone or pitch must vary with the hardness or elasticity in bodies. These differences in sound depend upon fixed physical laws, and must be constant. Whenever, therefore, we

find in the organs of the human body differences in tone or pitch upon percussion we may safely infer difference in structure. Every physician is acquainted with these principles, and is daily practising them. In the case of the heart, however, a tremendous obstacle is encountered in the presence of the ribs. When a percussion blow is applied over one of these the vibrations created are conveyed along its entire length, and a stethoscope applied over it will communicate the sound generated in that rib. This sound overpowers or greatly obscures any sound that may come from underlying structures. Herein lies the great obstacle that has prevented the successful practice of auscultatory percussion of the heart.

When a vibrating body is brought into intimate contact with another body it communicates to it its own vibrations, yet when these bodies differ materially in density, at each change of medium a portion of the wave is reflected and the transmitted part is refracted and the sound is stifled and obstructed. This principle holds as between a rib and its cartilage. Therefore, when percussion is performed with the instrument resting free from the ribs receiving the percussion stroke, the interference of rib vibrations is eliminated and the great obstacle in the way of auscultatory percussssion of the heart is removed.

The heart extends normally as high as the upper border of the third rib. The farthest projection of the heart to the left will always be found in the vicinity of the apex. For clinical purposes, therefore, in locating the left border it is sufficient to locate it in the fifth space. Hence, the stethoscope is placed immediately to the left of the sternum and extending upward from the fourth space. Thus

located, the imperative condition also is met that the instrument must rest over a portion of the heart that is in contact with the chest wall. Auscultatory percussion is most conveniently performed with the patient in the dorsal position, the examiner at his right side. The instrument is held in the position indicated by an assistant or by the right hand of the patient with moderate pressure against the chest wall. A finger of the examiner's left hand serves as a pleximeter. It is placed in the fifth intercostal space, at a point so far to the left as to be entirely beyond the cardiac border. The pressure of the pleximeter finger must be uniform, as it is moved from place to place toward the middle line. To secure this uniformity it is advisable that the pressure of this finger be so firm that the fifth and sixth ribs are both distinctly felt in each position of the finger. In a thin person this pressure will not be strong, but in a fat person it must be quite firm. In the latter class of cases this firmness of pressure is essential for another reason. Transmission of a percussion impulse loses little by the interposition of light solids but much if loose or badly approximated tissues intervene; therefore, light percussion over a chest wall containing a considerable thickness of adipose tissue, does not transmit to the stethoscope the percussion note of the subjacent heart unless the pleximeter finger is thus deeply pressed into it, and heavy percussion must not be employed. Writers upon the subject emphasize the necessity for uniformity of stroke in the performance of percussion, but seem comparatively indifferent to the amount of pressure exerted by the pleximeter. In my opinion the latter point is of hardly less importance than the former. As has been intimated the percussion stroke in the

process I am describing must be of very moderate intensity, and it must be uniform in force. Thus inaugurated, percussion is made from left to right until the pitch of the percussion note is observed to change, the site of this change representing the situation of the left border of the heart. As was stated by the authors of the method, in reference to the use of auscultatory percussion: "The percussion sound communicated to the ear far exceeds in intensity and distinctness the same sound transmitted through the air. The slightest change in pitch and quality is readily appreciated."

In determining the situation of the right border the procedure is similar. The chest piece of the instrument is placed at the left of the sternum, at the point already mentioned. Percussion is made in the fourth space, at which level is found the greatest projection of the heart to the right. Commencing well beyond the cardiac limit, the examiner passes from right to left noting the border of the heart at the point where the change in the quality of sound first appears. Similar percussion will locate the right border at other points, if so desired.

In almost all cases of cardiac disease every purpose is served by the accurate determination of the right and left borders. However, if it seems desirable to determine the upper limit and the left border above the fifth space this may be done by placing the instrument at the left of the sternum and below the fourth rib. Likewise, the apex may be outlined when the instrument is in the position for fixing the left border in the fifth space.

The late Dr. Alfred L. Loomis, in his work on physical diagnosis stated that the first to recommend auscultatory percussion in examination of the

heart were Drs. Cammann and Clark, in a publication in the *New York Journal of Medicine and Surgery* of July 1840. It was not until a month ago that I enjoyed the privilege of reading this paper. I found myself working along their lines precisely except in one very important particular, to which I shall refer. This was the Dr. Cammann whose stethoscope we have used, and it was Dr. Alonzo Clark whose signature adorns the diplomas of some of us. The paper was entitled "A New Mode of Ascertaining the Dimensions, Form, and Condition of Internal Organs by Percussion." Among other things, they claimed that "the heart can be measured in all but its anteroposterior diameters, under most, perhaps all, circumstances of health and disease, with hardly less exactness than we would be able to do if the organ were exposed before us." A review of their patient experiments is very convincing of the truth of their claims. They affirm: "We have been able to trace the outlines of the heart when the whole organ has been covered with healthy lung; when the lung over it and around it has been hepatized from inflammation or consolidated by tubercles; when, with such tuberculous consolidation, there has been remarkable thickening of the pleuritic membrane over the precordial region; when pleuritic effusion on either side has to ordinary percussion blended the cardiac and pulmonary portion of the chest into one region of unbroken dullness; when extreme effusion on the left side has crowded the heart wholly to the right of the median line upon the convex surface of the liver so as to produce uninterrupted dullness from the entire left side across the anterior right half of the chest to the hepatic region; when there has been empyema and pneumothorax of the left side; when there has been

atrophy of the heart; when there has been hypertrophy and dilatation, each separately and both combined; when there has been preternatural softening and fatty degeneration; when there has been pericarditis with adhesions; when the stomach has been filled with aliment or the abdomen with food."

These writers were entitled to the confidence of the profession. Why, then, did this work fail to attract attention and the method receive no favor? I attribute it to two causes. First, because the significance of the size of the heart had not been fully realized; second, because the practical application of the method was not made convenient or easy. Cammann and Clark invented a special stethoscope with which to overcome the intervention of the ribs. It consisted in a truncated wedge of cedar wood, the other end broad, to rest against the ear of the examiner. The wedge was placed between the ribs. Their paper does not indicate that they realized the part played by the costal cartilages in respect to rib vibrations or the possibility of dodging these vibrations and still being able to accomplish the desired results.

A word as to other methods of measuring the heart. Four years ago Dr. Charles S. Williamson of Chicago, himself an internist and a teacher, presented a paper before the Medical Society of the Missouri Valley, in which he showed the inaccuracy of conclusions derived from ordinary percussion for the purpose of locating the cardiac borders. Fluoroscopic pictures displayed the errors of capable diagnosticians. Indeed, I believe no one who has studied the matter will claim that ordinary percussion is at all dependable.

Very great importance is attached to the location of the apex beat. This plan has been elaborated

by Richard C. Cabot. Now, in a great many cases it is impossible to locate the apex beat and these are very likely to be the cases in which it is especially important to determine the size of the heart, for even murmurs may be absent and the case be most serious. A friend of mine, attempting a demonstration before a class, asked a patient to rise to a sitting posture and lean forward. She did so, but when she leaned forward she was dead. Usually, the left border is outside of the apex beat, but frequently the apex beat is outside of the left border.

Of course, the method of choice is the use of the roentgen ray, but this is available in only a very small minority of cases, while auscultatory percussion is available under all.

I must mention two infrequent conditions that must be excepted. One of these is an extreme degree of emphysema, with a large body of lung crowded between the heart and the chest wall. The other is found in aged persons with complete ossification of the costal cartilages. Here percussion anywhere upon any rib gives rise to a ringing sound which is carried over the whole chest as though it were a steel cage.

Nine years ago, in an article in the *New York Medical Journal*, I called attention to the advantage of auscultatory percussion of the heart. For at least fifteen years I have employed it with the utmost satisfaction. For my part, I must express emphatically the conviction that in ignoring this method of examination the profession has been depriving itself of an aid of the utmost value.

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